

BDM REPORT: To Increase the Sale and Reduce the Manufacturing Cost of a Firm of Bricks Industry

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INDEX

Sr. No.	Content	Page
1.	List of Figures	2
2.	Executive Summary	3-4
3.	Detailed Explanation of Analysis Process/Method	4-7
4.	Findings and Results	7-13
5.	Interpretation of Results	13-14
6.	Recommendations	14-18

List of Figures

Sr No.	Figure Name	Page
1.	Monthly Sales Data	8
2.	Types of rallies and their quantity	9
3.	Percentage contributions of different vendors in total clay quantity	10
4.	Percentage contributions of different vendors in total clay cost	10
5.	Price of coal(Per ton) on different dates	11
6.	Percentage contributions of different costs in total manufacturing cost	12

◆ **Executive Summary:**

This is the final document in line with the BDM project “**To Increase the Sale and Reduce the Manufacturing Cost of a Firm of Brick Industry**”. In this project, we have identified two problems of **Ramdev Bricks Manufacturers** which are to increase the sale and reduce the manufacturing cost of bricks. The primary data for the project were collected and the process of collecting the data is mentioned in the mid-term report. The data needed to be analysed. The analysis process began with transferring raw data from books to Excel sheets, followed by cleaning the data by organizing and imputing missing values where necessary. Then descriptive statistics were obtained using Excel, and the data was interpreted using charts and graphs to identify patterns and trends. The detailed analysis process is given in the section “**Detailed Explanation of Analysis Process/Method**”. After doing qualitative and quantitative analysis it’s been revealed that there is a difference between the actual sale and what the firm had estimated. It’s been also revealed that the main contributors to manufacturing costs are labour and coal cost, a detailed explanation is given in the “**Findings and Results**” section. These results were then interpreted. Interpretations indicate that the actual sales of the bricks are lower than the assumed sales due to inadequate daily sales data maintenance. The sales graph shows fluctuation, which may be due to irregular bulk purchases by buyers. Manufacturing cost analysis shows that coal is the most expensive raw material, contributing around 41% to the total manufacturing cost. Labour cost is also high as it is paid on a per-brick basis. And the clay cost is also higher than expected. The detailed interpretations are given “**Interpretations of Results**” section. Based on the analysis and my understanding firm can implement several cost-cutting solutions to reduce the manufacturing cost of bricks, resulting in increased sales. One way to reduce the cost of clay is to buy it at the right time from the right vendor, and a similar strategy can be applied to coal. Another solution is to shift to different fuel sources such as agricultural waste, which is available at no cost, thereby reducing the manufacturing cost. The firm can also reduce labour costs by paying them on a daily wage basis instead of a per-brick basis. Keeping proper records of all expenses, sales, buyers, and sellers in an Excel sheet can help the firm analyse its business more efficiently and learn from past

mistakes. Finally, the firm can find contractors to sell bricks to, which will lead to increased sales and a constant stream of buyers. However, implementing these solutions may face some challenges, such as finding suppliers, storing excess materials, finding daily wage labourers, and maintaining proper records. The detailed recommendation is given in the “**Recommendation**” section.

◆ **Detailed Explanation of Analysis Process/Method:**

➤ **Book-Keeping To Excel:**

The data that was collected from the firm was completely raw data and stored in books and diaries. So, the first job was to put it on Excel sheets with identifying appropriate variables of the data. This process was the longest as I needed to put the data in Excel manually. And it took around 2-3 days.

➤ **Data Cleaning:**

After putting the data onto Excel sheets, it needed to be cleaned for further analysis.

- The sales data that were collected was on daily basis. So data was merged on monthly basis.
- In sales data, from July 22 to Nov.22 the values were missing. And the missing values were imputed with the mean of daily sales data.
- In rally data the quantity was measured in two different units: Dumper and tractors and there were two kinds of rallies. So I needed to understand the units in a particular context and put them on a sheet according to that. And also separated the data according to types of the rally.
- Wood & Digging data was very straightforward, we got all the quantities that were purchased and the number of hours digging was done and their respective cost. So I just put them straight on the sheets.

- The coal data involved two costs transportation cost and coal's price. So we needed to extract the same from the raw data of coal. There were also different vendors so that information is also extracted.
- Clay is a very important raw material in the manufacturing of bricks. And there were three vendors from whom the firm bought clay at different prices so this information needed to be extracted from raw data.
- The other cost like different labour wages, water expenses, electricity, transportation cost, loading cost, lease cost and cleaning costs were very difficult to extract but with the help of the owner we also got these data and we cleaned them appropriately.

➤ **Getting Descriptive Statistics:**

To know about the data set we needed to find metadata and descriptive statistics to get a starting point to understand the problems of business, their impact on business, the causes of the problems, their possible solution and the overall impact of that solution on business. To get descriptive statistics about our data set we used MS Excel. The detailed descriptive statistics of the data are given in the “Descriptive Section” of the Mid-Term Report. However, some of the important descriptive statistics are highlighted in the “Results and Findings” section. The kind of descriptive statistics I have used are given below:

- *Measure of Central Tendency:* The measure of central tendency gives an idea of what a typical value data set can take. Ex: Mean, Mode, Median etc.
- *Measure of Dispersion:* The measure of dispersion gives an idea about the spread of the data set. Ex: Standard Deviation, Variance, Range etc.

- *Summary of Data-set:* The minimum, maximum and quartile value gives us the overall short summary of the data set.

➤ **Listen to Data:**

As we know data speaks a lot but we need to listen carefully to get meaning out of that. So then I tried to understand what data is trying to tell us. The details of what data is trying to tell are given in the section “Findings and Results”. And to understand it we needed a form of communication and the following medium of communication I have used:

- **Line-Chart:** Line-Chart is a very useful chart to give the trend in a time-series data set.
- **Pie-Chart:** Pie-Chart gives the percentage of contribution of different components as a whole.
- **Bar-Chart:** The Bar-Chart is used to compare things.

➤ **Interpretation of Results and Findings:**

After getting results and findings from the data set, now it was time to interpret these findings to find the cause and clues of problems which we are trying to solve. These interpretations are given in the section “Interpretation of Results and Findings”. And below are steps that were taken to achieve this goal:

- I tried to interpret the data with the knowledge and learning that has been acquired in the Business Data Management course(i.e. How to read a graph).
- After applying the knowledge of the industry and market situation of different raw-material that are being used in this industry I came up with different reasons behind the particular nature of the data set.
- Now, these interpretations were cross-checked with the help of the owner and the internet.

➤ **Finding Solutions:**

After reaching out to the cause of the problems, Now I tried to find the recommendations for that problems, their impact on the problem and the overall impact on the business itself. The recommendations and their impacts are explained in the section “Recommendation to The Problems”. For finding the recommendations, we took the help of owners and the internet.

◆ **Findings and Results:**

Below are some of the findings and results after analysing our data set:

➤ **Qualitative Results:**

- I have taken a few interviews with the owner of the firm. They think they produce around 10 lakhs bricks per annum but data has suggested that in the year from Dec. 21 to Nov. 22, they have only produced around 7 lakhs of bricks i.e., a loss of around 3 lakhs bricks which is very huge.
- In the discussion with the owner, it's been revealed that the labour cost and coal cost are very expensive for them that's why the overall cost of manufacturing is higher.
- He has also said that the transportation cost of clay is higher because from where they bring clay is far from the manufacturing unit.
- It also has been revealed that in future they may have to shift their manufacturing unit to some other place as it's very near to the town and it's causing environmental issues.
- After talking to the owner and looking at the data, it may be said that they do not have contractor buyers.

➤ **Quantitative Results:**

1. Sales Data:

- There is no apparent trend in the sales Data Rather there is much fluctuation in the graph.
- There is a sudden increase in a month and then a drop in another month from Dec. 21 to May-22.
- The graph is smooth during the month from Jun 22 – Sep. 22.
- The lowest sale happened on Nov. 22 and the highest was on Jan. 22.

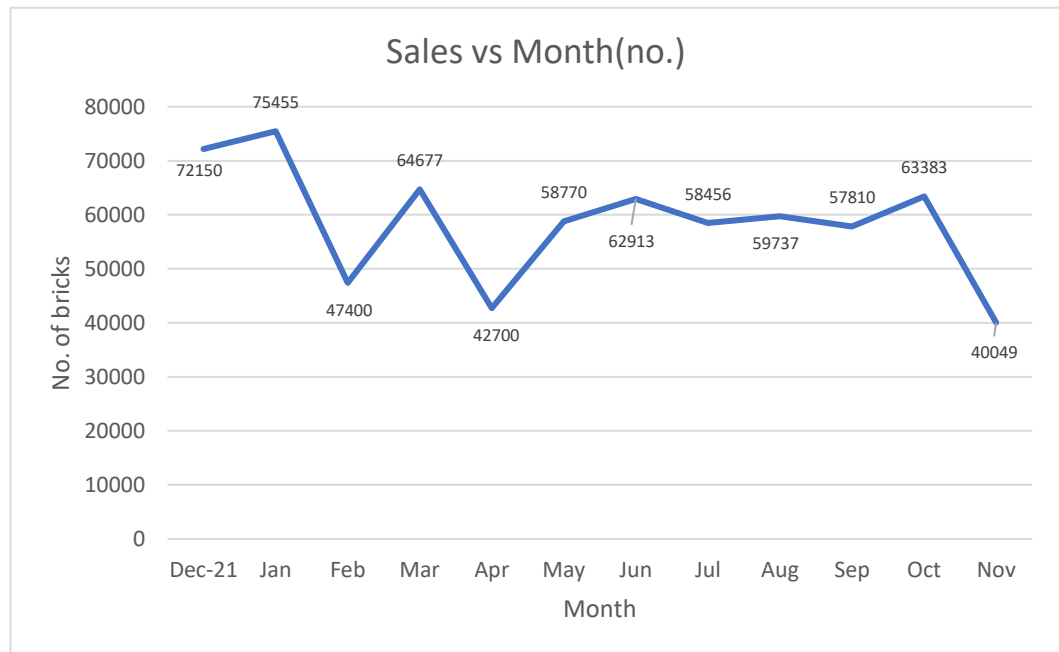


Figure 1: Monthly Sales Data

2. Manufacturing Cost Data:

1. Rally's Data:

- ◆ 2 kinds of rallies were bought for different uses of respective rallies.
- ◆ The “Type 1” has a price on the higher side and the “Type 2” has a price on the lower side.
- ◆ As you can see in the graph, the quantity of the “Type 2” rally is more than the “Type 1”.
- ◆ The total cost incurred: ₹96400.
- ◆ Price Per Dumper:- Type1: ₹9500; Type2: ₹6000

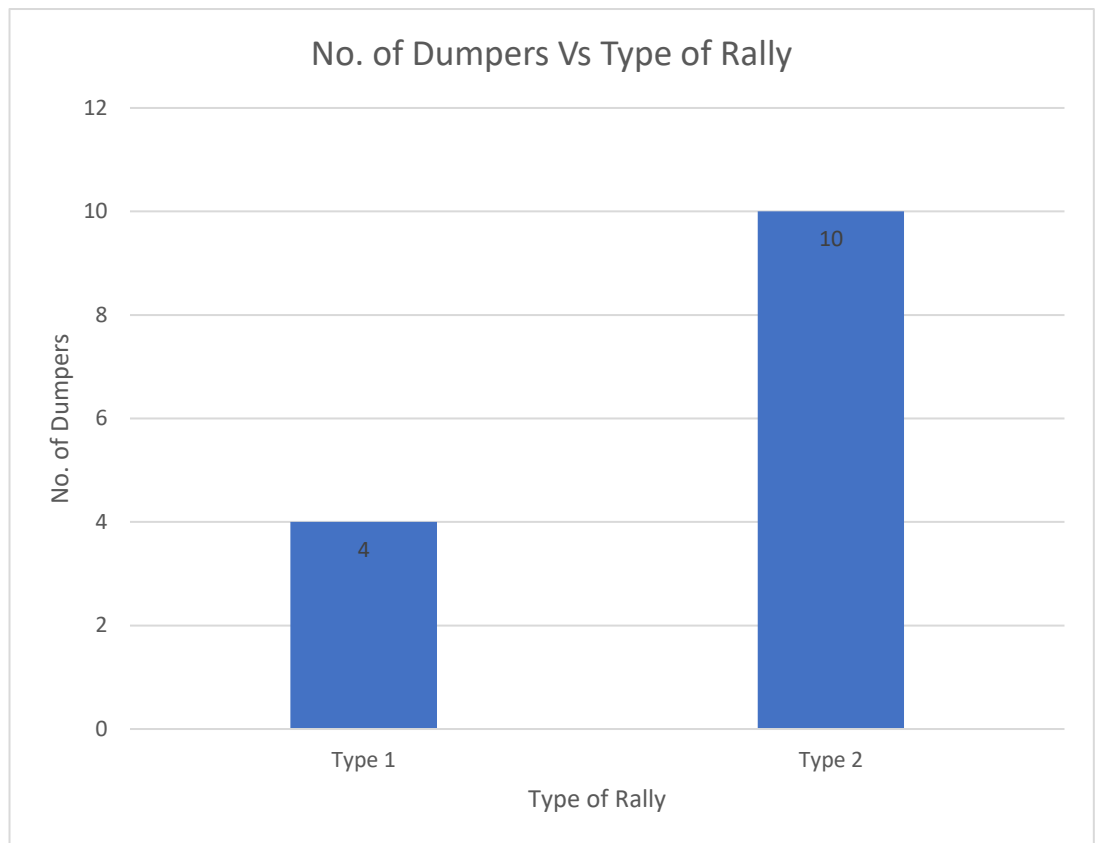


Figure 2: Types of Rallies and their quantity

2. Wood's Data:

- ◆ The wood is used in helping to burn the coal that gives the heat to bake the bricks.
- ◆ The total quantity that was used in the previous year was 5420 Kg that cost around ₹18970.

3. Digging Data:

- ◆ To clear the place where bricks are made firm has to dig there.
- ◆ And digging is also used to mix raw materials.
- ◆ The total no. of hours that digging happened was 69 hours and that cost around ₹69,000.

4. Clay's Data:

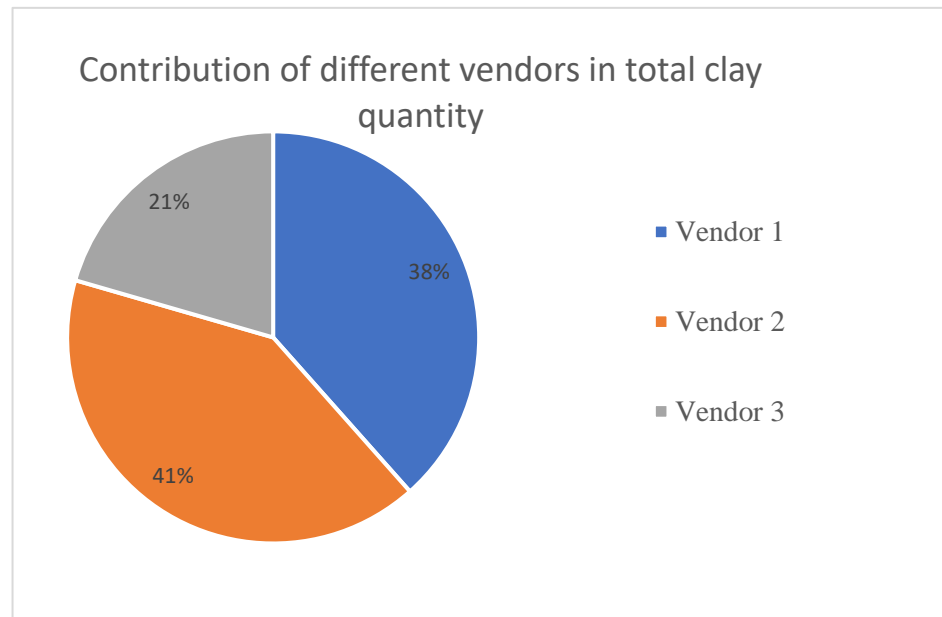


Figure 3: Percentage contribution of different vendors in total clay quantity

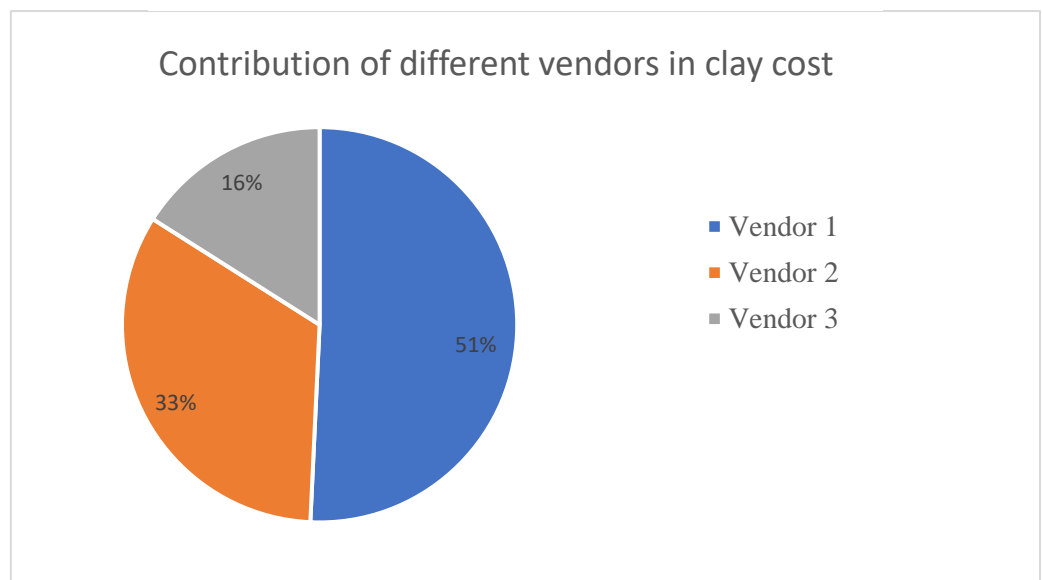


Figure 4: Percentage contribution of different vendors in total clay cost

- ◆ The clay data is the most fundamental raw material in the manufacturing of bricks.
- ◆ There were three vendors from whom we bought clay.
- ◆ The total no of trips of clay that were bought: 385 trips
- ◆ Price Per Trip: Vendor1: ₹1100; Vendor2: ₹675; Vendor3: ₹650.
- ◆ And total cost was: ₹3,20,800
- ◆ In the graph, we can see that the highest percentage of clay quantity was bought from “vendor 2”. And the least percentage of clay quantity was bought from “vendor 3”.

- ◆ But we can see in the second graph that the contribution of vendor1 in total clay cost is highest and vendor3 has the least contribution.

5. Coal's Data:

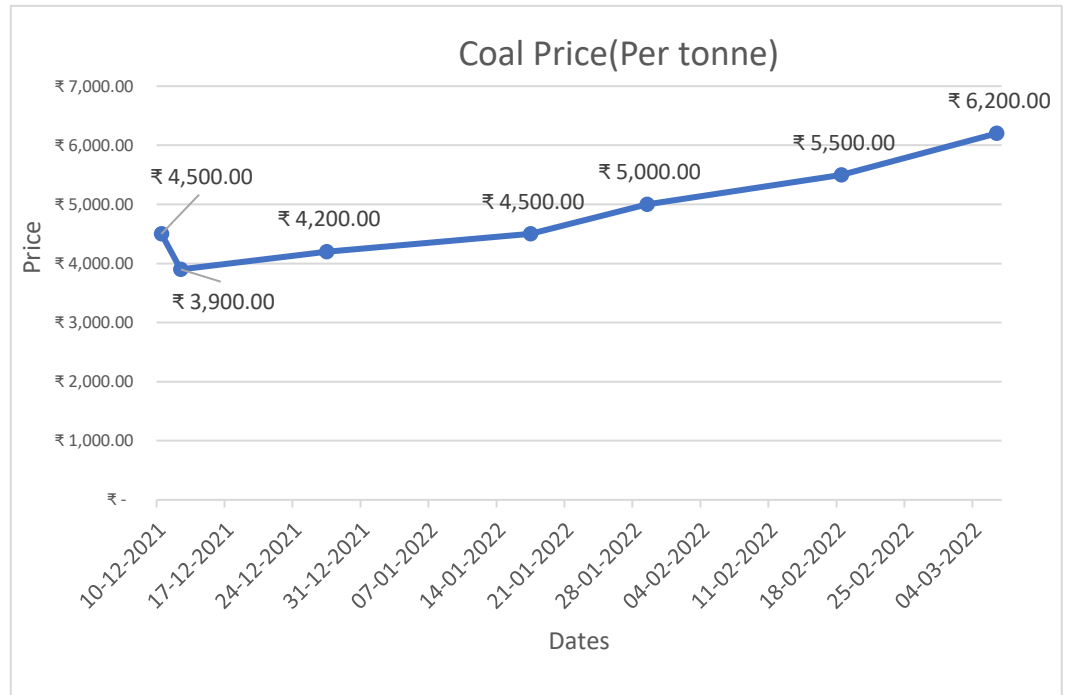


Figure 5: Price of coal(per tonne) on different dates

- ◆ Coal is the costliest raw material among all raw materials.
- ◆ The difference in the price of coal affects the manufacturing cost and thus affects the profit of the firm.
- ◆ There were 3 different vendors from the coal that was bought but it did not impact the cost that much except for some difference in transport fare.
- ◆ You can see an upward trend in the cost of coal.

6. Other Cost:

(i) Labour Cost:

- The labour cost is the second costliest component of the manufacturing process.
- The total labour cost occurred was ₹8,29,125.
- Labour cost per brick: ₹1.18.

(ii) Electricity Cost:

- In manufacturing bricks another important raw material is water. And the firm is extracting water from the ground using a motor.
- Total electricity expense was ₹6360.11.

(iii) Cleaning:

- The cleaning expense was ₹30,000 for 6 months.

(iv) Transportation Cost:

- Driver's Salary: ₹1,20,000 /Annum
- Diesel's Expense: ₹14,070

(v) Lease Cost:

- The lease cost is ₹40,000/year.

(vi) Loading Cost:

- To load the bricks in tractors the total loading cost that was incurred was ₹70,350.

7. Summary of Manufacturing Cost:

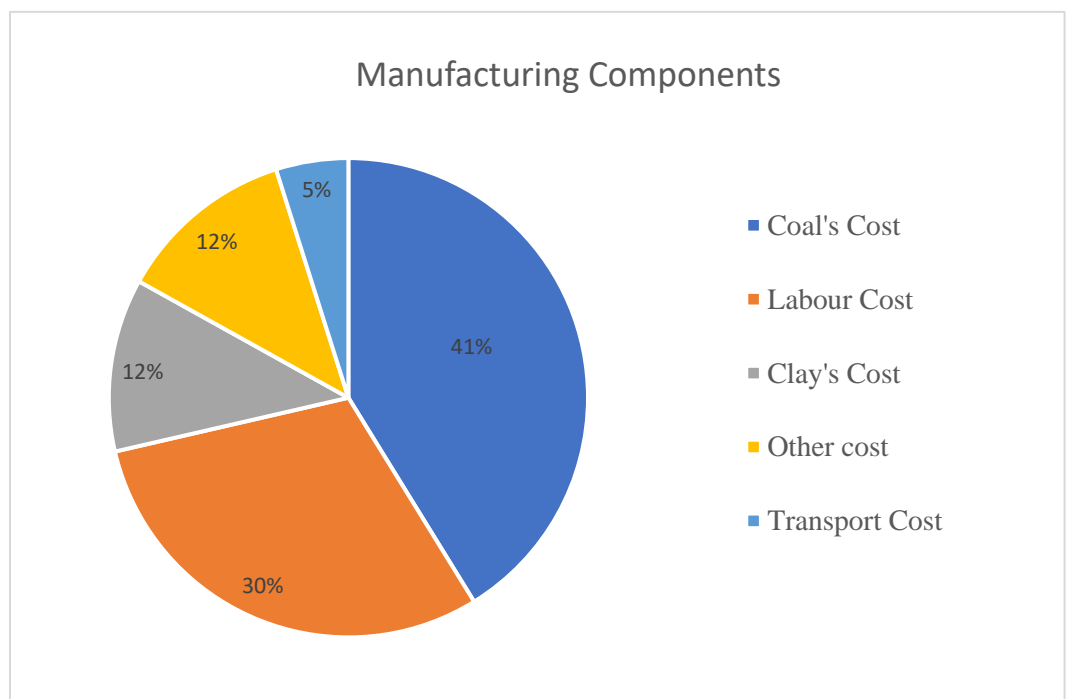


Figure 6: Percentage contribution of different cost in total manufacturing cost

- ◆ In this pie chart, we can see that the two biggest contributors to manufacturing cost are coal and labour that is 41% and 30% respectively.
- ◆ The clay cost's contribution is around 12% even though this is the most fundamental raw material in the manufacturing of bricks.
- ◆ Transportation cost is around 5%.
- ◆ The other cost that consists of the rally, wood, digging, electricity, loading, cleaning and lease cost contributes around 12% of the total manufacturing cost.

◆ **Interpretation of Results:**

➤ Sales Data:

- As in the results, it has been revealed through data that their actual sale is 7,03,500 bricks while they were assuming 10,00,000 bricks. This difference may be occurred because of not rigorously maintaining daily sales data.
- The sales graph is smooth from July to Sept. 2022. This is because in this period the sales data was not available to us so we imputed data with the mean sale value.
- The sales graph has many ups and downs which means there is much fluctuation. It may be because they do not have constant buyers and the buyers are not buying bricks in bulk. And it may affect their planning for manufacturing bricks.
- The sales may be low because they may not be manufacturing enough bricks and this might be because of fewer resources like land, labour, raw material etc.
- If we look at the sale graph specially Jan-Feb, Mar-Apr., Oct-Nov. There is a sudden rise in Jan then a drop in Feb, same with other twos. This might be because, in the subsequent month of sudden rise's month, they didn't have enough bricks to sell i.e., they may be facing inventory management issues.

➤ Manufacturing Data:

- The rallies, wood and digging are essential things and processes so we will be able to do much about this cost.

- Clay is the most fundamental raw material in the manufacturing of bricks. And the firm had bought clay from 3 different vendors. But the total cost of clay is on a little bit of the higher side. Vendor 1 had the most expensive price per trip of clay. And the firm bought around 38% of the clay quantity from vendor1. They needed to buy clay from vendor1 even though they have 2 more choices might because of the time of buying. As they bought clay from vendor2 and vendor3 in Dec. and Jan month and from vendor1 from March to July.
- Coal is the most expensive raw material of all costs. It contributes around 41% of the total manufacturing cost that's why the manufacturing cost of bricks is higher. Not only it contributes the most but also its prices are varying which affects the manufacturing cost.
- The second costliest thing in the process is labour cost as the labour cost is around ₹0.75/brick for making and ₹0.43/brick to put it in the kiln. As the firm is paying labour costs on a bricks basis, not on a daily wage basis that may be the reason for higher labour costs.

◆ **Recommendations:**

1. Reducing Clay Cost:

(i) Buying clay at right time:

Implementation: The firm can buy clay at right time from the right vendor. As in the area where this firm operates the manufacturing process starts in November and last till April end. So the process of buying starts from March only so in this period the price of clay tends to go higher and also you might have to buy the clay from farther places that's why the prices of clay are higher in this period while December and January is not the period of buying the clay and the firm can take benefit of that and buy clay in this period as the data also suggests that the price of clay from March to July is around ₹1100 and during December and January the price is ₹675 and ₹650.

Impact: If they could have bought the clay from vendor2 and vendor3 in Dec and January, the total cost would have been

₹2,57,900 a total 20% reduction in clay's cost. That means a reduction in manufacturing cost and they might have sold bricks at a lower price than other firms increasing sales.

Challenges: Now implementing this solution has some challenges.

a) The first challenge is the sellers who are nearer to the firm's plant and whether they will be able to fulfil the firm's demand for clay.

b) The second challenge is storing the extra clay. If the firm buys the clay in excessive amounts than the firm needs at that time then the firm might have to face the storage issue.

2. Reducing Coal Cost:

(i) Buying Coal at Right Time:

Implementation: The coal price tends to increase from Nov to Mar. So the best time to buy coal is Dec. So the firm can buy all its coal demand in Dec only as data also is suggesting it.

Impact: If the firm could have bought the coal in Dec., the total cost would have been ₹9,46,400 instead of 11,31,738.40 i.e., a 16% of reduction in coal's cost. That means a reduction in manufacturing cost and they might have sold bricks at a lower price than other firms increasing sales.

Challenges: Now implementing this solution has some challenges.

a) If the firm is planning to buy coal in advance the firm needs to make a very rigour plan to get the exact quantity of coal to buy otherwise firm might have to face inventory issues.

b) The second issue again the storage capacity and maintenance of coal.

(ii) Shift to a different fuel source:

Implementation: As coal is used to generate the heat so we can move to some alternate sources of generating heat like natural gas, biogas, solar energy, and agricultural waste.

The most effective source would be an agricultural waste.

Because agricultural waste is just thrown away and the firm

can take benefit of this and buy this waste at no cost and can use it as a fuel source.

Impact: As the firm can get this fuel source at no cost (even at 0 prices) the firm will have to incur only transportation costs which may decrease the manufacturing cost drastically thus a reduction in the manufacturing cost of bricks increasing sales. And using agricultural waste as a fuel source also has environmental benefits.

Challenge: Now implementing this solution has some challenges.

- a) The firm will need agricultural waste in bulk and finding the agricultural waste may be a difficult job and transportation of that would be a challenging task.
- b) The energy content of agricultural waste is less than that of coal which means w.r.t to coal we will need more agricultural waste volume wise and that will raise storage capacity issues.

3. Reducing Labour Cost:

(i) Wage daily:

Implementation: The firm can pay the labour on a daily wage basis instead of no. of bricks made basis.

Impact: Right now the firm is paying their labours on bricks i.e., for making a thousand bricks they pay ₹750 and for putting 700 bricks in the kiln they pay ₹300. Now if the firm pays them on a daily wage basis the firm can reduce labour costs to ₹5,70,150 from ₹8,29,125 i.e., a 31% of reduction in labour cost which is huge. And this will reduce the overall manufacturing cost of manufacturing increasing sales.

Challenges: Now this solution has some challenges

- a) Finding labours on daily basis may be a difficult task for owners. And we hire labours than we need to give them through the year but the actual manufacturing process lasts only 6 months.
- b) Paying labours on a brick basis is beneficial in terms of competition because if we are paying them on a brick basis then labours tend to make more bricks in a day which

increases their efficiency. But if the firm is paying on daily basis, then their efficiency might decrease and the firm will need to keep a person to watch them whether they working properly or not.

4. Maintain the Data Properly:

Implementation: The firm should keep details of everything in an Excel sheet properly. (Or even in diaries but should be proper)

Impact: The firm can watch out for everything like their expense, their sale details, their buyers, their sellers, etc. It would help them analyse their business more efficiently and they can implement their learning from past mistakes.

Challenges: Now to keep everything properly the firm may need a dedicated person for this work and it will increase the manufacturing cost.

5. Find Contractors:

Implementation: Right now the firm doesn't have big buyers(Like Contractors), so the firm can contact local contractors and can build relations with them and sell bricks to them.

Impact: Finding contractors as their buyers have two benefits. First, they will buy bricks in bulk quantity which means an increase in sales. The second one is contractors are frequent buyers, so the firm's sales will be constant and they can plan their manufacturing process more smoothly.

Challenge: The biggest challenge in this solution is finding contractors and maintaining relationships with them.

6. Expand the Business:

Implementation: Right now the firm is operating in around 4 bighas but the firm may think to expand there to increase its sales. And the business is already thinking of that.

Impact: This will have two impacts, their capacity will increase. And in some of the solutions that I recommended to the firm have the issue of storing so if they are thinking to expand their business these challenges will also be resolved. It will also help to manage

their inventory and from the sales graph, it can be seen that they might be facing inventory issues.

Challenge: In this solution, they may face the challenge of locating their new area, they need to take a lot of considerations like transportation cost, distance from populated areas etc. And they also need to raise their fund and find sources to raise their fund.